# Dual wavelength low group velocity Photonic Crystal for resonantly pumped surface emitting lasers

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Two-dimensional Photonic Crystals (2DPCs) are ideal objects for fabricating micrometer-sized laser sources. Until now the main effort has been devoted to achieving high Q cavities or low group velocity modes at the lasing wavelength. But 2D periodicity gives *sophisticated* means of engineering the photonic modes. Capitalising on this, we designed and operated a dual wavelength laser structure which exhibits a low group velocity mode *both* at the lasing and the optical pumping frequencies. As a further sophistication we fabricated an InP-based two-dimensional photonic crystal slab laser with a photonic mode lying in the bound quantum well electronic level. The pump and lasing modes are separated by just one Longitudinal Optical phonon energy, in order to minimize thermal effects. Laser operation is demonstrated at 1566 nm in the pulsed regime. A threshold of 4kW/cm$^2$ is obtained. With respect to the usual method of high energy optical pumping, which involves the creation of carriers in high electronic levels, our laser shows a 10 fold improvement.